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STUDIES IN THE GENUS BIDENS. IV

CONTRIBUTIONS FROM THE HULL BOTANICAL LABORATORY 232

EARL E. SHERFF

(WITH PLATES IX AND X)

Bidens mollifolia, sp. nov.—*Herba annua, 1.2–1.8 m. alta (ex inscriptione Pringlei); caule et ramis plus minusve acute tetragonis, subviridibus aut purpurascensibus, dense tomentosis (aut supra etiam fere glabris); ramis ad finem liberum in aliquot ramiculos aut pedunculos divisis, ut quaeque planta 30–60 capitula habeat. Folia opposita, petiolata, petiolo adjecto 2–9 cm. longa, ternata aut pinnata, dense et molliter pilosiuscula aut tomentosula, infra pallidiora; foliolis (3–7) ovatis aut lanceolatis, serratis, lateralibus (infimis interdum ternatis) 1–3.5 cm. longis et 0.5–2 cm. latis, terminali 1.8–5 cm. longo et 0.7–2.3 cm. lato; petiolis dense tomentosis, basi connatis, 0.3–2.5 cm. longis. Capitula breviter pedunculata pedunculis 0.5–3 cm. longis, ligulata, 5–7 mm. alta et ad anthesin et in fructu, ligulis adjectis 1.5–2 cm. lata. Involucrum basi hispidum, squamis duplice serie dispositis; exterioribus (6–8) linearibus, ad apicem obtusis, sparsim hispidis et plus minusve ciliatis, 2–3 mm. longis; interioribus lanceolatis, maximam partem glabris, margine diaphanis, 3–5 mm. longis. Ligulae (circ. 5) obovatae aut oblanceolatae, rosaceae, 3–7-striatae, apice 2–4-lobulatae lobulis subrotundis, 0.8–1 cm. longae. Paleae lineares, margine diaphanae, demum 5–7 mm. longae et terminis tortis achaenia superantes. Achaenia subtetragona, clavae similima, infra angustiora, apici calva et areolata, nigra, glabra, 3–4 mm. longa.*

C. G. Pringle 6050, at altitude of 2285 m., Sierra de San Felipe, Oaxaca, Mexico, November 16, 1894 (type in Herb. Gray); *E. W. Nelson* 1176 *pro parte*, at altitude of 2875–3353 m., in vicinity of Cerro San Felipe, Oaxaca, Mexico, September 1, 1894; *idem* 1363, at altitude of 2285–2875 m., 29 km., southwest of City of Oaxaca, Oaxaca, Mexico, September 10–20, 1894; *idem* 1476 *pro parte*, at altitude of 1675–2285 m., Valley of Oaxaca, Oaxaca, Mexico, September 20, 1894. All the specimens examined had been determined as

Bidens leucantha (L.) Willd. or *B. pilosa* L.; but in tall, slender habit, nature of pubescence, and short, clavate, exaristate character of fruit they are very distinct from either of these species.

Bidens cornuta, sp. nov.—Herba annua, 3–5 dm. alta; caule et ramis tetragonis, striatis, glabris, tenuibus. Folia opposita, petiolata, petiolo adjecto 3–12 cm. longa, 3–6 cm. lata, pinnata (aut summa bipinnata), ciliata, supra subglabra, infra sparsim adpresso-hispida; foliolis vel dentatis vel incisis vel etiam (imis foliorum superiorum) distincte partitis, ovatis aut lanceolatis; petiolis 0.3–3 cm. longis, glabris, ad basim hispidam connatis. Capitula terminalia, discoidea (aut interdum subligulata?), tenuiter pedunculata pedunculis 2–9 cm. longis. Involucrum basi glabrum, squamis dupli serie dispositis; exterioribus (5–8) linearibus, glabris aut infra hispido-ciliatis, 2–3 mm. longis; interioribus late linearibus, glabris, striatis, margine diaphanis, 4–5 mm. longis. Paleae lineares, striatae, margine diaphanae, demum 5–10 mm. longae. Achaenia anguste linearia, striata, triaristata; maturis aristis longis (5–7 mm.) et divaricatis, supra tenuissime et retrorsum hamosis, demum plus minusve deciduis; quibusdam exteriorum achaeniorum subbadii, hispidis, 6–10 mm. longis; interioribus elongato-attenuatis, nigris vel subnigris vel ad apicem subflavidis, infra glabris, supra hispidis, 1.3–2 cm. longis.

Dr. Edward Palmer 131, at altitude of 730 m., Hacienda San Miguel, southwestern Chihuahua, Mexico, August, 1885 (type in Herb. Gray).

ASA GRAY had treated this plant as “*Bidens bipinnata* L. var. *aristis* demum patentissimis”; but from *B. bipinnata* it differs decidedly in its less divided foliage, its narrower, more elongated, fewer-fruited heads, and its peculiar achenes with awns (when still attached) diverging so that, especially if pressed flat on the herbarium sheet, they suggest narrow horns. The specific description given above is drawn up from the type and various cotypes studied in different American herbaria. These vary considerably in the amount of dissection of the foliage, but all display very uniformly the peculiar fruit characters.

Bidens leptcephala, sp. nov.—Herba annua, 1–5 dm. alta, glabra, ramosa; caule et ramis tetragonis, striatis, tenuibus. Folia opposita (aut summa alternata), petiolata, petiolo adjecto 2–10 cm. longa, 1.5–5.5 cm. lata, bipinnata (inferiora non saepe unipinnata), minute ciliata, minutissime hispida (praecipue ad

venas); petiolis o.3–4 cm. longis, sparsim hispido-ciliatis, ad basim connatis. Capitula terminalia, subradiata aut discoidea, ad anthesin 3–5 mm. alta et (radiis comprehensis) 4–8 mm. lata, in fructu 1–1.5 cm. alta et solum 2–4 mm. lata, tenuissime pedunculata, pedunculis 2–8 cm. longis. Involucrum basi subglabrum, squamis dupli serie dispositis; exterioribus (4–6) linearibus, ciliatis, 1–2.5 mm. longis; interioribus dimidio longioribus, lanceolatis, glabris aut ad apicem pubescentibus, margine diaphanis. Ligulae (si praesentes) circiter 3, minimae, circ. 2.5 mm. longae et 1.2 mm. latae, integrae aut ad apicem bidentes, 4–5-striatae, subalbidae. Paleae anguste lanceolatae, striatae, margine dia-phanae, demum 5–7 mm. longae. Achaenia pauca (5–9 aut etiam 13), subtetragona, linearia, biaristata aristis retrorsum hamosis; quaedam exteriora badia aut subnigra, hispida, 6–8 mm. longa; interiora nigra aut ad apicem helvola, infra glabra, supra hispida, o.9–1.4 cm. longa.

J. C. Blumer 1712, in shade, sandy alluvium soil at altitude of 1615 m., near Cedar Gulch, Paradise, Chiricahua Mountains, Arizona, September 21, 1907 (type in Herb. Gray); *idem* 2144, at altitude of 1760 m., base of rhyolite slope, Wilgus Ranch, Chiricahua Mountains, Arizona, September 4, 1907; *Dr. J. M. Bigelow* (Lieut. A. W. Whipple's Explor. Exped.), Hurrah Creek, Fort Smith to the Rio Grande, September 25, 1853–54; *E. L. Greene* 263, banks of the Upper Gila River, New Mexico, August 29, 1880; *J. G. Lemmon* 333, near Fort Huachuca, Arizona, in 1882; *idem*, Apache Pass, Chiricahua Mountains, Arizona; *idem* 3029, near Fort Huachuca, Arizona, in 1883; *Mr. and Mrs. J. G. Lemmon*, Apache Pass, Fort Bowie, Arizona, September 1881; *C. G. Pringle* 62, near Arivaca, Arizona, August 31, 1884; *David Griffiths* 1985, Hudson Ranch, near Pierce, Arizona, October 1900; *idem* 5994, fenced area, Santa Rita Forest Reserve, Arizona, September 27—October 4, 1903; *idem* 6014, above Range Reserve, Santa Rita Mountains, Arizona, September 12—October 18, 1903; *J. J. Thornber* 72, at altitude of 1780 m., Stone Cabin Canyon, Santa Rita Mountains, Arizona, September 14, 1903; *Griffiths* and *Thornber* 65, Santa Rita Mountains, Arizona, September 20—October 4, 1902.

This species has been confused with *Bidens Bigelovii* Gray and *B. bipinnata* L. by various botanists. Thus, for example, ASA GRAY determined a specimen of *Bigelow's* 581 as *B. bipinnata*, but *Lemmon's* 3029, which was identical, he designated on the label as "*Bidens Bigelovii* varying toward *B. bipinnata*." From these two species it differs very clearly in its more slender, delicate habit, and in its slender fruiting heads with their smaller number of achenes. In foliage, some of the larger specimens have leaves rather like those of *B. Bigelovii*.

Bidens Langlassei, sp. nov.—Herba (annua?) erecta, circiter 1 m. alta, parce ramosa; caule glabro, acute et perspicuissime quadrangulato, basi tumido et ligneo. Folia opposita, petiolata, petiolo adjecto 2.5–5.5 cm. longa, pariter 2.5–5.5 cm. lata, bi-aut tripinnata (summa pinnata aut indivisa), supra glabra, margine hispidulo-ciliata, infra remotissime hispida, ultimis segmentis linearissimis, 0.5–1 mm. latis, integris, acute apiculatis; petiolis 3–7 mm. longis, plus minusve hispido-ciliatis, basi connatis. Capitula terminalia, ligulata, tenuiter pedunculata, pedunculis 1–11 cm. longis. Involucrum basi sparsim hispidum, squamis dupli serie dispositis; exterioribus (12–16) linearissimis, fere glabris, 6–7 mm. longis; interioribus linearibus, margine diaphanis, circ. 3 mm. longis. Ligulae (6–7) flavae, subanguste ellipticae, 7–15-striatae, ad apicem denticulatae, circ. 1.5 cm. longae. Paleae squamis interioribus similes sed demum longiores. Achaenia immatura. Ovaria (1–1.3 mm. longa) subplana, apice annulo 10–15 setulorum coronato.

E. Langlassé 332, in clay soil at altitude of 1200 m., "Le Faixin," southern Mexico (perhaps Farascon, Michoacan), September 8, 1898 (type in Herb. Gray).

The description is drawn from the type and one cotype (the latter in U.S. Nat. Herb.).

Bidens capillifolia, sp. nov.—Herba tenuis, verisimiliter annua, +3 dm. alta, ramosa, glabra (aut ramis ad eorum basim hispida); caule et ramis subteretis, striatis. Folia opposita, petiolata, petiolo adjecto 2–6 cm. longa, pinnata, foliolis linearissimis, indivisis aut lobatis, margine integris, 0.5–1 mm. latis; petiolis 0.6–1.5 cm. longis, ad basim connatis. Capitula terminalia, discoidea, longe et tenuiter pedunculata, pedunculis 4–15 cm. longis. Involucrum basi plus minusve setoso-hispidum, squamis dupli serie dispositis; exterioribus (3–5) linearibus, glabris aut sparsim hispidis, 6–8 mm. longis; interioribus anguste lanceolatis, glabris aut sparsim hispidis, margine diaphanis, 4–6 mm. longis. Paleae lineares, margine diaphanae, demum 6–8 mm. longae. Achaenia linearia, tetragona, biaristata aristis retrorsum hamosis; 1–3 exteriora rufo-badia, sparsim tuberculato-hispida, circiter

6 mm. longa; interiora nigra (nisi ad apicem), elongata, glabra aut supra remote hispida, 9–14 mm. longa.

Barber and Townsend, Sierra Madre, Chihuahua, Mexico, July 17, 1899 (type in U.S. Nat. Herb., herb. no. 663169). The nearest known ally of this species is *Bidens tenuisecta* Gray, a plant with a less branched and less delicate habit, wider leaf divisions, and more hispid involucre. I have seen only the type specimen.

***Bidens carpodonta*, sp. nov.**—Herba annua, erecta, 3–6 dm. alta; caule et ramis tetragonis, striatis, subglabris. Folia opposita, petiolata, petiolo adjecto 2–7 cm. longa, remotissime hispida, bi- aut tripinnata, ultimis segmentis linearibus, integris, 0.5–1.5 (raro 2.5) mm. latis, ad apicem acutis; petiolis ciliatis, basi con-natis, 0.1–1.5 cm. longis. Capitula terminalia, ligulata, tenuiter pedunculata, pedunculis 3–10 cm. longis, ad anthesin ligulis adjectis 1.5–2.5 cm. lata et 0.6–1 cm. alta, in fructu 0.7–1 cm. lata et 0.8–1.2 cm. alta. Involucrum basi setoso-hispidum, squamis dupli serie dispositis; exterioribus (6–8) linearibus, hispido-ciliatis, indurato-apiculatis, 3–5 mm. longis; interioribus lanceolatis, margine diaphanis, glabris, paulo longioribus. Ligulae (circ. 5) flavae, ovatae, 12–15-striatae, apice 2–3-dentatae, 0.8–1 cm. longae. Paleae lineares, striatae, margine diaphanae, demum 5–8 mm. longae. Achaenia linearia, tetragona; quaedam exteriora sub-fusca, dense tuberculata, apice exaristato sed ad circumferentiam minute spinuloso-dentato, 4–6 mm. longa; interiora nigra, plerumque subsparsim tuberculato-hispida, demum elongata et 0.8–1 cm. longa, raro biaristata aristis nudis aut retrorsum 1–3-hamosis, sed plurimum exaristata, apice (erecte spinuloso-denticulato circulo) coronato.

Dr. Edward Palmer 419, San Lorenzo Canyon, 9.6 km. southeast of Saltillo, Coahuila, Mexico, September 21–23, 1904 (type in Herb. N.Y. Bot. Gard.).

Differs from *B. procera* Don in having achenes that are much more attenuate and lack elongate, numerously barbed aristae. From *B. Schaffneri* (Gray) Sherff it differs in general aspect of foliage and in its longer achenes. It is nearest to *B. ludens* Gray and might pass for that species except for its longer and much narrower achenes. A study of numerous specimens of *B. procera*, *B. Schaffneri*, and *B. ludens* has convinced me that these species, bearing at times a close superficial resemblance to each other and thus having been more or less confused in herbaria, are very definitely separable and have fruit

characters respectively constant. This being true, it seems certain that the 15 or more beautiful plants collected by *Palmer* (no. 419), and all of them having uniquely elongate, very attenuate achenes, are likewise specifically distinct.

Bidens pseudalausensis, sp. nov.—*Herba*, verisimiliter annua, circiter 6 dm. alta (ex *Langlassae* inscriptione), ramosa; caule et ramis tetragonis et acute angulatis, striatis, glabris. Folia opposita, petiolata, petiolo adjecto 2–7 cm. longa, 1–5.5 cm. lata, bipinnata, glabra; ultimis lobis cuneato-ob lanceolatis, dentatis dentibus ad apicem induratis; petiolis 0.2–2 cm. longis, ad basim connatis, Capitula terminalia, tenuiter pedunculata pedunculis 1.5–6 cm. longis, ligulata, ad anthesin 6–7 mm. alta et (ligulis adjectis) circ. 1.5 cm. lata. Involucrum basi glabrum, squamis dupli ci serie dispositis; exterioribus (circ. 8) linearibus, ciliatis, 2–3 mm. longis; interioribus paulo longioribus, glabratis, margine diaphanis. Ligulae (circ. 5) albae (e *Langlasseo*), in sicco specimine luteolae, striatae, obovatae, ad apicem lobulatae aut obtusissime dentatae, 5–7 mm. longae. Achaenia (1–3 maturata in capitulis singulis) linearia, nigra, faciebus plus minusve glabra, marginibus tuberculato-hispida, biaristata (aristis sub apicem retrorsum hamosis), 7–9 mm. longa.—Differt a *B. alausensi* H.B.K. habitu ramoso, etc.

E. Langlassé 541, at altitude of 580 m., "El Ocote, Cerro Pedregoso, Michoacan and Guerrero," Mexico (type in U.S. Nat. Herb.).

Bidens aequisquama (Fernald), comb. nov.—*Bidens rosea* Schz. Bip. var. *aequisquama* Fernald, Proc. Amer. Acad. 43:68. 1907.

This rare species differs very markedly from *Bidens rosea* Schz. Bip., not only in its involucres but also in its foliage and achenes. The type of *B. rosea* (*Cosmos pilosus* H.B.K.) is still extant (in Herb. Mus. Hist. Nat. Paris) and, though rather immature, is not separable from such specimens as *Heyde* and *Lux* 6172 and *Palmer* 192 (cf. GREENMAN, Proc. Amer. Acad. 41: 264. 1905). From a study of numerous specimens that occur in different herbaria it is seen that *B. rosea* has a very slender, upwardly narrowed type of achenes, produced in rather small heads. Their aristae at maturity are mainly devoid of barbs. In some material (for example, *Heyde* and *Lux* 6164, Guatemala, 1894, a form with bipinnate leaves) the aristae are very short or even obsolete. But in *B. aequisquama* the achenes are in larger heads and are thicker. They are not narrowed above. Their aristae are much more

conspicuous, averaging $\frac{1}{3}$ to $\frac{1}{2}$ the length of the achene body, and are armed with many retrorse barbs that are not deciduous. Many other characters likewise are pronounced, making it seem best, therefore, to give herewith a full specific description, drawn from the type and various cotypes examined.

BIDENS AEQUISQUAMA, descript. amplificat.—Herba, +5 dm. alta; caule ramisque pubescentibus aut subglabris, quadrangularibus, striatis. Folia opposita, petiolata, petiolo adjecto 3–8.5 cm. longa, indivisa aut tripartita, ciliata, supra subglabra, infra sparsim adpresso-hispida et pallidiora; indivisis foliis lanceolatis, subcrasse serratis; foliolis foliorum tripartitorum similiter serratis, terminalibus ovatis aut lanceolatis, lateralibus ovatis et subsessilibus et minoribus; petiolis 0.4–1.8 cm. longis, hispidis, ad basim connatis. Capitula terminalia, ligulata, pedunculata, pedunculis 1–6 cm. longis et ad apicem creberrime albido-pubescentibus. Involucrum basi hispidum; squamis duplii serie dispositis; exterioribus (9–16) linearibus, hispidis, 2–4 mm. longis; interioribus subaequalibus, lanceolatis, glabris aut ad apicem et longitudinaliter medio hispidis, margine diaphanis. Ligulae (circ. 8) roseae, striatae, apice irreguliter 2–4-dentatae, 9–11 mm. longae, 6–8 mm. latae. Paleae lineares, margine diaphanae, 4–6 mm. longae. Achaenia nigra, linearia, ad apicem plus minusve hispida, biaristata, aristis non adjectis 4.5–7 mm. longa, flavis aristis retrorsum hamosis et 2.5–3 mm. longis.

“*BIDENS SEEMANNII*” Schz. Bip., ex Seem. Bot. Herald 307. 1852–57; *Cosmos Seemannii* Gray, Proc. Amer. Acad. 19: 16. 1883.

SCHULTZ BIPONTINUS believed the genus *Cosmos* to be unworthy of separate treatment and accordingly he united it with *Bidens*. But since his time, special students of the Compositae have persisted very uniformly in recognizing *Cosmos* as a distinct genus (cf. GREENE, Pittonia 4: 245. 1901). Indeed, the characters of the type species of that genus (*Cosmos bipinnatus* Cav.) are so pronounced as to make it very improbable that SCHULTZ BIPONTINUS’ view will ever be accepted by botanists in the future. This being the case, there arises a slight difficulty in fixing upon the characters by which most accurately to distinguish between *Cosmos* and *Bidens*. The technical character most noticeable

in a number of *Cosmos* species is the rostrate achenes. *Cosmos bipinnatus* Cav., *C. parviflorus* H.B.K., *C. caudatus* H.B.K., *C. sulphureus* Cav., and *C. ocellatus* Greenm. are among those species displaying this character in a marked degree. A study of such species shows that the rostrate achenes are accompanied in *almost* every case by two other characters; namely, some shade of red in the ligules and the appearance of the interior involucre in the somewhat immature heads, suggesting the conspicuous inner involucre found so commonly in species of *Coreopsis*. But there are a few species of *Cosmos* in which the mature achenes tend to be erostrate. Thus, *Cosmos crithmifolius* H.B.K. and *C. linearifolius* (Schz. Bip.) Hemsl., in the many specimens that I have seen, fail almost uniformly to exhibit achenes swollen below and distinctly long-rostrate above as in *C. bipinnatus*. Yet in color of ligules and character of involucre they harmonize perfectly with *Cosmos*. While neither of these two characters is absolutely diagnostic, their simultaneous occurrence, coupled with a tendency of the central achenes at maturity to be elongate, even though indistinctly rostrate, shows both species to be true *Cosmos* beyond all question, and not *Bidens*.

HEMSLEY (Biol. Centr. Amer. 2: 203. 1881), in dealing with the Compositae of Mexico, very correctly considered these two species as belonging to *Cosmos*. But " *Bidens Seemannii*," a species so identical generically with *Cosmos crithmifolius* that HEMSLEY himself erroneously referred to it Parry and Palmer 485 (true *C. crithmifolius*), he retained as *Bidens*. At a later date ASA GRAY suspected Ghiesbreght 264 of being " *Bidens Seemanii*" and stated that, if it was, the name should become *Cosmos Seemannii* (Proc. Amer. Acad. 19: 16. 1883). In Gray Herbarium, the Ghiesbreght specimen studied by GRAY is still preserved in good condition. It is identical with *Seemann* 2014 (in Herb. Kew), thus confirming GRAY'S supposition. It is accompanied by a letter to GRAY from HEMSLEY, which must have been written later than 1881 and probably later than 1883 (the dates of the two works above cited). In this letter HEMSLEY, speaking of " *Bidens Seemannii*," wrote, "I do not see how *C. crithmifolius* differs generically."

GREENMAN (Proc. Amer. Acad. 41: 265. 1905), relying upon the erostrate achenes, retained "*B. Seemannii*" in *Bidens*. But, as might be inferred already, if this treatment were to be adopted, then the subgeneric congeners of this species, such, for example, as *Cosmos crithmifolius*, would likewise have to be placed in *Bidens*, a procedure that surely would meet with little acceptance, if any. Thus it seems best to follow the views of GRAY and HEMSLEY in this matter and treat the species as *Cosmos Seemannii* (Schz. Bip.) Gray.

Besides the specimens of *C. Seemannii* listed by GREENMAN (*loc. cit.*), I have examined the following: *J. N. Rose* 3435, in the Sierra Madre, near Santa Teresa, Terr. de Tepic, Mexico, August 11, 1897; *Dr. Edward Palmer* 1852, Tepic, Terr. de Tepic, Mexico, January 5—February 6, 1892; *Arsène*, Cerro San Miguel, Morelia, Mexico, February 1909.

"*BIDENS PALMERI*" Gray, Proc. Amer. Acad. 22: 429. 1887.

This species, with its strongly ribbed leaves, is very close to *Cosmos crithmifolius* H.B.K., but differs in its yellow rays and slightly different leaf outline. In most specimens the achenes are clearly erostrate, but occasionally some of the central achenes become highly elongated above, appearing almost distinctly rostrate and thus exactly simulating those of such species as *Cosmos crithmifolius* and *C. linearifolius*. This is especially notable in certain material collected by Barnes and Land (nos. 164 and 189, in Herb. Field Mus.). In fact, the subrostrate character of the achenes was known to GRAY (cf. GRAY, *loc. cit.*, "acheniis subulatis . . . subrostratis"). Yet, curiously enough, he placed this species in *Bidens*, while previously (Proc. Amer. Acad. 19: 16. 1883) he had given the name *Cosmos Seemannii*, as shown above, to the Ghiesbrecht plant, described by himself as having "essentially beakless . . . achenes."

As this plant belongs very properly in *Cosmos*, it is renamed *Cosmos Landii*, nom. nov.¹

I have examined the following specimens: *Dr. Edward Palmer* 315, Rio Blanco, Jalisco, Mexico, August 1886; *C. G. Pringle* 2348, vicinity of Guadalajara, Jalisco, Mexico, November 2, 1889; *idem* 11490, banks of ravines at

¹ In honor of Dr. W. J. G. LAND of the University of Chicago, the excellent specimens collected by him and C. R. BARNES having served materially to extend our conception of this species.

altitude of 1525 m., Rio Blanco near Guadalajara, Jalisco, Mexico, October 6, 1903; C. R. Barnes and W. J. G. Land 164 and 167, at altitude of 1707 m., Sierra de San Estaban, Jalisco, Mexico, September 28, 1908; *idem* 189, at altitude of 1737 m., Sierra de San Estaban, Jalisco, Mexico, September 28, 1908.

BIDENS TENUISECTA Gray, Plant. Fendl. 86. 1849; *Bidens cognata* Greene, Leafl. Bot. Crit. 1: 149. 1905.

In describing *Bidens cognata*, GREENE (*loc. cit.*) stated that it was "allied to *B. heterosperma*." He then proceeded to differentiate it from that species, which was very easy to do because *B. heterosperma* was so unlike it. Here, as in certain other cases (cf. SHERFF, BOT. GAZ. 56: 494. 1913), GREENE's error consisted in referring the plant to the wrong species and then founding a new species upon the points of dissimilarity. His type material (*O. B. Metcalfe* 1436) is merely a low, rather much branched form of *Bidens tenuisecta* Gray, with the type of which (in Herb. Gray) it is connected by numerous specimens in American herbaria.

"BIDENS DILLENIANA" Hill, Veg. Syst. 3: 123. 1761.

This name seems to have escaped the serious attention of botanists for more than a century and a half. The *Index Kewensis*, although it cites the name, does not cite the habitat. HILL himself (*loc. cit.*) called it the "dwarf hemp agrimony" and stated that it was a British plant ("a petty plant of our own country"), but his generalized illustration and brief description were entirely too vague for satisfactory determination. However, on turning to his earlier work (Brit. Herb. 461. 1756), we find (under *Verbesina*) a much fuller description of the dwarf hemp agrimony, along with descriptions of what are now known as *Bidens cernua* L. and *B. tripartita* L. This description and the earlier name cited there by HILL, *Verbesina minima* Ray, show positively that the plants later named *Bidens Dilleniana* were merely the dwarf bog form of *Bidens tripartita* L. or the similar form of *B. cernua* L. (or very likely both these forms without distinction).

The name *Dilleniana* was given evidently for the very reason that DILLENIUS (Cat. Plant. Giss. 167, App. 66. 1719; ex Ray, Syn. 188. pl. 7. fig. 2. 1724) was the one to introduce the name *Verbesina minima* which HILL sought to displace.

BIDENS TRIPARTITA L. Sp. Plant. 831. 1753.

DRUCE (Fl. Berks. 283. 1897) has treated the dwarf form of this species as "forma *minima*." But it should be noted that DRUCE is not the first author to adopt this status, LARSSON (Fl. Werml. 221. 1859) having used it long before. Similarly, the dwarf form of *B. cernua* L., named "forma *minima*" by DRUCE (Herb. Dillen. 67. 1907), evidently under the impression that such treatment was new, was already described, years before, as *B. cernua* f. *minima* (Larss., *loc. cit.*, 220).

BIDENS CERNUA L. Sp. Plant. 832. 1753; *Bidens Kelloggii* Greene, Pittonia 4: 267. 1901.

A careful study of the type and other cited specimens of *Bidens Kelloggii* (in U.S. Nat. Herb.) shows them to be incapable of separation from *B. cernua*. GREENE classed these forms among the segregates from *B. laevis* (L.) B.S.P., but most inconsistently so, for, at the same time, he even stated that "DR. TORREY . . . more correctly referred them to *B. cernua*."

It may be remarked in passing that, in the future, supposedly new species allied with *Bidens cernua* should be described only after taking the utmost care to see that they are not mere atypic forms of that species. It would be interesting to subject *B. cernua* to elaborate breeding experiments. A beginning in this direction has been made already by GUPPY (Studies in Seeds and Fruits 480. 1912).

BIDENS ALBA DC. Prodr. 5: 605. 1836.—*Coreopsis alba* L., Sp. Plant. 908. 1753; *Chrysanthemum americanum, ciceris folio* . . . Herm. Par. 124. pl. 124. 1698; *Bidens pilosa* L. var. *alba* O. E. Schulz (*excl. synon. maximam partem*), Urb. Symb. Antill. 7: 136. 1911; *Bidens dondiaefolia* Less. (*ex descript. et loci situ*), Linnaea 5: 155. 1830.

This peculiar plant was treated by DECANDOLLE as one of the "species non satis notae." LINNAEUS' description ("foliis subternatis cuneatis serratis") and citation of habitat ("Insula St. Crucis") were drawn directly from the work of HERMANN, the Paradisus Batavus. Reference to this work (*loc. cit.*) shows a plant very unique in habit, especially as to its many foliose, sterile shoots and its cuneate leaf divisions. So rare has this form been in herbaria that it is easy to understand DECANDOLLE'S misgivings

regarding it. Recently, however, there has come to hand (in Herb. Field Mus.) a specimen (*C. R. Orcutt* 2886, Vera Cruz, Mexico) which agrees most minutely and strikingly with Hermann's plate which LINNAEUS cited; also another (*idem* 2991, Sanborn, Vera Cruz, Mexico) agreeing satisfactorily but having proliferous heads. Coming from the same locality in Mexico are other specimens which show transitions to a more elongate type of plant with some 5-parted leaves. One of these (*Mueller* 148, in Herb. N.Y. Bot. Gard.) is labeled *Bidens dondiaefolia* Less., a species likewise from Vera Cruz and the description of which it fits very well (I have not yet seen LESSING's type). It is noteworthy that LESSING called attention to the sterile shoots of this species; "rami plures steriles."

From these facts it is evident that *B. dondiaefolia* Less. is a synonym for *B. alba* (L.) DC., and that *B. alba* is a local species native mainly to the state of Vera Cruz, Mexico. It possibly does not occur in St. Croix, as stated by HERMANN (*loc. cit.*). Dr. C. F. MILLSPAUGH, himself an authority upon the flora of St. Croix, suggests to me, and very plausibly so, that in the preparation of HERMANN'S posthumous work, the name "Sancta Crux" perhaps became substituted for "Vera Crux," and that thus the locality "Insula St. Crucis" finally was published.

As to the worthiness of *Bidens leucantha* (L.) Willd. to rank separately from *B. alba*, future field observations and breeding tests are highly desirable. It seems much the safer course to retain the two names separately for the present rather than merge them as done by O. E. SCHULZ (*loc. cit.*).

The plant collected by Ghiesbreght (no. 551) and referred by GRAY (Proc. Amer. Acad. 19: 16. 1883) to *B. dondiaefolia* is a very different plant and is typical *B. chiapensis* Brandeg. The following list represents the specimens of *B. alba* so far determined by myself at the Field Museum and the New York Botanical Garden (certain numbers appearing to accompany mixed material elsewhere).

Fred Mueller 148, Vera Cruz, Mexico, August 1853; *idem* 4067, Orizaba, Vera Cruz, Mexico (in 1855?); *J. M. Greenman* 6, near wharf, City of Vera Cruz, Vera Cruz Mexico, January 22, 1906; *idem* 23, La Laguna, near City

of Vera Cruz, Vera Cruz, Mexico, January 22, 1906; *idem* 97, along the shore, north of City of Vera Cruz, Vera Cruz, Mexico, January 24, 1906; C. R. Orcutt 2886, Vera Cruz, Mexico, February 16, 1910; *idem* 2991, Sanborn, Vera Cruz, Mexico, April 18, 1910.

BIDENS HUMILIS H.B.K., Nov. Gen. et Sp. 4: 234. 1820.—
Bidens consolidaefolia Turcz., Bull. Soc. Nat. Mosc. 24: 185. 1851.

TURCZANINOW (*loc. cit.*) based his species *Bidens consolidaefolia* upon *Jameson* 693 from Quito. At Gray Herbarium is one sheet of specimens by JAMESON "from the vicinity of Quito and elsewhere," and the specimens at the top of the sheet, while lacking a number, match precisely the description of *B. consolidaefolia*. It is seen from a study of many specimens of *B. humilis* collected in the last half century, that *B. consolidaefolia* is merely a slender-leaved form of *B. humilis* and is in no way specifically distinct.

BIDENS CONNATA Muhl. ex Willd., Sp. Plant. 3: 1718. 1804.

FERNALD (*Rhodora* 10: 197. 1908) has given an excellent discussion of this species. Commonly it occurs with simple leaves and then is the var. *petiolata* (Nutt.) Farwell, but occasionally it possesses tripartite leaves, matching MUHLENBERG's original description of the species proper. In July 1913 it was my good fortune to be invited to accompany Dr. FERNALD from Cambridge, Mass., to Winchester, Mass., and there observe the tripartite leaves of the typical form, which grows in good quantity at that place. Tripartite leaves were present on young plants less than 3 dm. high. In the Central United States, however, tripartite leaves seem absent except on large, robust, well-developed specimens. FERNALD (*loc. cit.*) gives the range for the typical, tripartite-leaved form as extending from "Quebec to Massachusetts and Michigan and doubtless southward." This range is seen to be extended westward by the following specimens:

C. W. Duesner, Miller, Indiana, in 1908; O. E. Lansing Jr. 727, Roby, Indiana, September 16, 1899; *idem* 1179, Lake, Indiana, September 22, 1900; *idem* 2641, Roby, Indiana, September 20, 1906; E. E. Sherff 2016, Elgin, Illinois, September 12, 1915; Dr. J. T. Stewart, Peoria County, Illinois; F. W. Johnson 1123, Three Lakes, Wisconsin, August 24, 1914; J. H. Schuette, Green Bay, Wisconsin, August 30, 1881, and September 10, 1882; *idem*, Brown County, Wisconsin; F. H. Burglehaus, near Minneapolis, Minnesota, September 1892.

BIDENS FRONDOSA L. var. ANOMALA Porter ex Fernald, Rhodora 5: 91. 1903.

This variety is peculiar in having upwardly barbed awns, but the precise significance of their occurrence is difficult at present to judge. In a specimen of the corresponding form of *B. connata* Muhl., the var. *anomala* Farwell, I have observed numerous downwardly barbed awns in the same heads with upwardly barbed awns (Vasey, near Georgetown, Washington, D.C., September 23, 1888, in U.S. Nat. Herb.). WIEGAND (Bull. Torr. Bot. Club 26: 415. 1899) cites also similar material collected at Ithaca, New York. FERNALD (Rhodora 15: 75. 1913) inclines toward regarding *B. frondosa* var. *anomala* as a geographic variety. He cites Pennsylvania, New Jersey, Delaware, also the region from Maine to Cape Breton Island for its distribution. It is interesting to note that out of many hundreds of specimens of *B. frondosa* that I have examined from Europe and America, there were observed only two instances of specimens of the var. *anomala* having been collected outside the range given by FERNALD. These plants, coming from Kansas and Nebraska, go further in showing the distribution to be very discontinuous.

E. Hall, Kansas, in 1869 (in U.S. Nat. Herb.); *P. A. Rydberg* 1707, Middle Loup River, near Thedford, Nebraska, August 26, 1893 (in Herb. Gray, etc.).

BIDENS ANGUSTISSIMA H.B.K., Nov. Gen. et Sp. 4: 233. 1820.

The type of *B. angustissima* is matched very well by SCHULTZ BIPONTINUS' type of *B. linifolia* (both in Herb. Mus. Hist. Nat. Paris), except that the latter has only simple leaves, while the former has tripartite leaves. KLATT, in publishing the description of *B. linifolia* (Flora 68: 203. 1885), described the heads as discoid. But that rays were present on at least the Paris material is shown by SCHULTZ BIPONTINUS' label, in his own handwriting, which reads, "achs. rad. calva" Furthermore, PRINGLE (no. 6924, granitic ledges at altitude of 2895 m., Cerro Ventoso above Pachuca, Hidalgo, Mexico, August 18, 1898) has collected many fine specimens of the simple-leaved form, and these all show orange-yellow rays, about 8 on each head. Thus the only difference to be found between the two species is the questionable one of foliage.

At Gray Herbarium there occurs a single sheet (*Coulter* 375, Mexico) with three slender but well-developed specimens; the largest one, at the left, matching the type of *B. angustissima*, and the other two, at the right, matching the type of *B. linifolia*. From these it appears safe to say that *B. linifolia* will be found, on future field study, to be merely a simple-leaved state of *B. angustissima*.

BIDENS REFRACTA Brandeg., Zoe 1: 310. 1890.—*Bidens riparia* H.B.K. var. *refracta* O. E. Schulz, Urb. Symb. Antill. 7: 132. 1911.

SCHULZ (*loc. cit.*) regarded this species as only a variety of *B. riparia* H.B.K., and he differentiates the two forms on the basis of fruit characters. But an examination of many specimens of each form shows that the only genuine difference is in the foliage. *B. refracta* has tripartite leaves, while *B. riparia* has bipinnate leaves. This difference SCHULZ seems to have overlooked. Indeed, he even refers to *B. refracta* a plant collected by Tonduz (no. 13618, several fine specimens of which are in U.S. Nat. Herb., Herb. Brit. Mus., etc.) that is identical in foliage and other parts with the type and Bonpland cotype of *B. riparia* (in Herb. Mus. Hist. Nat. Paris).

Of 22 collections of *B. refracta* studied so far, I have seen only one instance where the leaves were not of the tripartite kind. In this case (*Jenman* 5499, British Guiana, October 1889, in U.S. Nat. Herb.) the leaves are somewhat more divided, but still far from resembling those of true *B. riparia*. The probabilities are strong that *B. refracta* and *B. riparia* are entirely distinct species.

BIDENS SQUARROSA H.B.K., Nov. Gen. et Spec. 4: 238. 1820.—*Bidens tereticaulis* DC., Prodr. 5: 598. 1836; *Bidens antiguensis* Coult., Bot. GAZ. 16: 100. 1891; *Bidens tereticaulis* DC. var. *antiguensis* O. E. Schulz, Urb. Symb. Antill. 7: 142. 1911; *Bidens tereticaulis* DC. var. *sordida* Greenm., Proc. Amer. Acad. 39: 115. 1903; *Bidens tereticaulis* DC. var. *indivisa* Robins., Proc. Bost. Soc. Nat. Hist. 31: 270. 1904; *Bidens Coreopsis* DC. var. *procumbens* Donn. Sm., Bot. GAZ. 42: 299. 1906.

DECANDOLLE (*loc. cit.*), in describing his *Bidens tereticaulis*, stated that it differed in having glabrate leaves, all of which were

trisected, in having heads smaller, and in coming from a different region ("Differt a *B. squarrosa* foliis glabriusculis . . . capitulo minore, foliis etiam superis trisectis et patria"). But he had not seen the type material of *B. squarrosa*, as is evidenced by his failure to use the abbreviation "v.s." in connection with its description (*loc. cit.*, 599). At Paris (in Herb. Mus. Hist. Nat. Paris) is still preserved KUNTH's type of *B. squarrosa*. Upon the label are the words "*Bidens squarrosa* mihi . . . Caracas." This is positively the specimen KUNTH had at hand in drawing up his description. It consists of a branchlet coming from a portion of a stem. The leaves of the branchlet are simple, as described by KUNTH. One well preserved leaf, still attached,¹ and certain similar but more fragmentary leaves, some of them broken loose, remain with the stem proper. These leaves are very important, as they establish definitely and beyond all question the identity of *B. squarrosa* with pubescent forms of *B. tereticaulis* DC., and not with *B. reptans* (L.) G. Don (with which it is equated by O. E. SCHULZ, *loc. cit.*, 140). This will become evident on reference to pl. IX, drawn directly from the type with the utmost fidelity to all details.

The presence of pubescence in this species is not of specific importance, a fact recognized by GREENMAN (*loc. cit.*) and by SCHULZ (*loc. cit.*, 142) when they treated very tomentose specimens as mere varieties of *B. tereticaulis*. Nor is the presence of several or even many undivided leaves of decisive value, a fact recognized by ROBINSON (*loc. cit.*) in treating as a variety of *B. tereticaulis* a specimen with all of its leaves simple. That COULTER (*loc. cit.*) treated his *B. antiguensis* (pl. X) as a distinct species² is easily explained by the fact that the strong superficial resemblance of his first type specimen's foliage to that of certain hispid forms of *B. leucantha* (L.) Willd., led him to contrast it with that species,

¹At least when I examined it in 1914, as may be verified by a photograph taken by myself at that time and now deposited, with many hundreds of others of the genus *Bidens*, in the herbarium of Field Museum. The specimen was very brittle and certain parts were observed to crack even during my cautious handling of it.

²It may be noted that the Guatemalan form *B. antiguensis* has glabrous awns on its achenes. This character, which, however, is inconstant in some cases, is noticeable in nearly all the specimens of *B. squarrosa* from Central America. In South America and in Mexico the awns are almost always barbed.

from which he very properly regarded it as distinct. It is interesting to observe that COULTER also noted the remarkable variation in pubescence ("exceedingly variable in pubescence, from glabrous to pilose-pubescent").

B. Coreopsisidis DC. var. *procumbens* Donn. Sm. is a form of this species. Its leaves are mainly 5-parted and are slightly narrower than in most specimens. It approaches rather closely *B. reptans* (L.) G. Don var. *bipartita* O. E. Schulz, of Porto Rico, but as a rule is quite distinct from that form.

Since *B. squarrosa* thus is found to be so highly variable, it is thought best to present here a rather full and representative list of specimens studied: *H. H. Rusby* 1642, at altitude of 609 m., Guanai, Bolivia, May 1886; *Mig. Bang* 1406, Guanai-Tipuani, Bolivia, April to June 1892; *Humboldt and Bonpland*, Caracas, Venezuela; *A. Fendler* 696, near Tovar, Venezuela, 1854-55; *H. H. Smith* 519, at altitude of 609 m., Jiracasaca, Santa Marta, Colombia, October 1898-1901; *C. Hoffmann* 383, Valley of the Rio Legardo, Costa Rica; *Ad. Tonduz* 12284, at altitude of 1800 m., forests of the Mala Via at Copey, Costa Rica, April 1898; *idem* 7265, banks of the Rio Maria Aguilar near San Jose, Costa Rica, December 29, 1892; *idem* 13600, in thickets, Nicoya, Costa Rica, January 1900; *idem* 7058, at altitude of 1100 m., San Francisco de Guadalupe, Prov. San Jose, Costa Rica, January 1896; *idem* 7248, in thickets upon banks of the Rio Torres near San Francisco de Guadalupe, Costa Rica, January 4, 1893; *Bolley* 7028, in copses near San Mateo, Costa Rica, January 18, 1892; *C. F. Baker* 2121, Dept. Leon, Nicaragua, January 17, 1903; *idem* 2214, Masaya, Dept. Masaya, Nicaragua, January 27, 1903; *H. Pittier* 1838, at altitude of 600 m., in hedges around Copan, Honduras, January 9, 1907; *Luis V. Velasco* 8873, San Salvador, Salvador, December 1905; *W. A. Keller-man* 5341, El Rancho, Sierro de las Minas Mountains, Baja Vera Paz, Guatemala, January 6, 1906; *idem* 5351, at altitude of 1205 m., Moran, Amatitlan, Guatemala, February 11, 1905; *idem* 6118, Volcano Acatenango, Chimaltenango, Guatemala, February 8, 1907; *idem* 8035, at altitude of 1067 m., El Rancho, Sierra de las Minas Mountains, Baja Vera Paz, Guatemala, January 1908; *Maxon and Hay* 3162, at altitude of about 550 m., vicinity of Secanquim, Alta Vera Paz, Guatemala, January 4, 1905; *John Donnell Smith* 2354, at altitude of 1778 m., Antigua, Sacatepequez, Guatemala, April 1890; *Heyde* and *Lux* 4193, at altitude of 1956 m., Buena Vista, Santa Rosa, Guatemala, December 1892; *E. W. D. Holway* 4, at altitude of 1778 m., Guatemala City, Dept. Guatemala, Guatemala, December 31, 1914; *idem* 110, at altitude of about 1778 m., Solola, Guatemala, January 25, 1915; *H. von Tuerckheim* 297, at altitude of 1565 m., Coban, Alta Vera Paz, Guatemala, May 1886; *idem* 7900, at altitude of 350 m., Cubilquite, Alta Vera Paz, Guatemala, January 1901; *Charles C. Deam* 109, at altitude of 49 m., Los Amates, Izabal, Guatemala,

February 12, 1905; *Enrique Th. Heyde* 666, Guatemala, in 1892; *Berlandier* 730 and 2150, Tantoyuca, Vera Cruz, Mexico, December 1830; *idem* 2148, Mexico; *Botteri* 489, Orizaba, Vera Cruz, Mexico; *Bourgeau* 1560, Valley of Cordoba, Vera Cruz, Mexico, October 12, 1865; *idem* 3093, Orizaba, Mexico, October 3, 1866; *C. Conzatti* 122, at altitude of 1200 m., Mountains of Oaxaca, Mexico, September 20, 1895; *idem* 1581, at altitude of 1800 m., Cerro San Antonio, Oaxaca, Mexico, October 28, 1906; *idem* 2269, at altitude of 2000 m., Cerro San Felipe (Distr. del Centro), Oaxaca, Mexico, October 18, 1908; *Conzatti* and *Gonzalez* 1133, at altitude of 850 m., Cordoba, Vera Cruz, Mexico, December 1900; *E. A. Goldman* 30, at altitude of 244 m., near Metlatoyuca, Puebla, Mexico, January 27, 1898; *idem* 493, Apazote, Campeche, Mexico, December 28, 1900; *E. W. D. Holway* 3667, Oaxaca, Mexico, October 18, 1899; *E. Langlassé* 689, at altitude of 300 m., southern Mexico, December 2, 1898; *E. W. Nelson* 1508, at altitude of 1585–2075 m., Valley of Oaxaca, Oaxaca, Mexico, October 2, 1894; *idem* 1824, at altitude of 1600–1955 m., 9.6 km. above Dominguillo, Oaxaca, Mexico, October 30, 1894; *idem* 3410, near Yajalon, Chiapas, Mexico, November 21, 1895; *C. R. Orcutt* 3031, Sanborn, Vera Cruz, Mexico, April 18, 1910; *C. A. Purpus* 3633, Zacuapan, Vera Cruz, Mexico, October 1909; *Charles L. Smith* 298 and 633, at altitude of 1955–2135 m., Monte Alban, near City of Oaxaca, Oaxaca, Mexico, October 1894; *idem* 587, Coatzacoalcos, Vera Cruz, Mexico, February 6, 1895; *Lucius C. Smith*, at altitude of 2135 m., Rancho de Calderon, Oaxaca, Mexico, September 10, 1894.

Bidens Brandegeei, sp. nov.—Herba annua, erecta (nisi infra plus minusve arcuata), 3–5 dm. alta, maximam partem albido-hispida. Caulis quadrangulatus, striatus, ramis tenuibus ramosus. Folia opposita, petiolata, petiolo adjecto 1–8 cm. longa, pinnata aut bipinnata, supra minus albido-hispida; foliolis 3–5, ovatis (aut ovato-lanceolatis) serratisque et non dissimilibus iis *B. leucanthae* (L.) Willd., aut pinnati partitis, lobulis aut dentibus indurato-apiculatis; petiolis 0.2–2.5 cm. longis, basi connatis. Capitula pauca, terminalia, ligulata, tenuiter pedunculata, pedunculis monocephalicis, 3–8 cm. longis. Involucri squamis subaequalibus duplii serie dispositis; exterioribus (circ. 8) linearibus, 1-nervatis, apiculatis, albido-ciliatis et-hispidis, 4–5 mm. longis; interioribus lanceolatis, membranaceis, glabratis aut pubescentibus, margine diaphanis. Ligulae (circ. 5) obovatae, in specimine sicco albido-flavae, 7–9-striatae, ad apicem obscure dentatae, 1–1.3 cm. longae. Paleae lineares, margine diaphanae, 3–4 mm. longae. Achaenia (submatura) attenuato-linearia, striata, exaristata, supra antrorsum hispida, 4–6 mm. longa.

T. S. Brandegee, in vicinity of San Luis Tultitlanapa, Puebla, near the Oaxaca boundary line, Mexico, in 1908 (first type sheet in Herb. Univ. Cal., herb. no. 134267, and second type sheet, dated July, also in Herb. Univ. Cal., herb. no. 134268); *C. A. Purpus* 4429 (in vicinity of San Luis Tultitlanapa, Puebla), Oaxaca, Mexico, August 1908.

A species having at times all the leaves tripartite and then deceptively like *B. leucantha* (L.) Willd. except as to achenes. The description is drawn mainly from the two flowering specimens on the first type sheet, but the achene characters are described from the single fruiting head present on the second type sheet. The species is here named for T. S. BRANDEGEE, who himself has described several species of *Bidens*, and who by his collections and writings has extended our knowledge of this genus to a considerable extent.

Recently, Dr. SIDNEY F. BLAKE has sent from Gray Herbarium a specimen of *Bidens* that appeared to him as allied with *Bidens rubifolia* H.B.K., but none the less new. The plant was collected by HOLWAY in Guatemala early in the present year, and is described by him as "climbing over trees 40–50 feet and then dropping down nearly to the ground." Its heads, in antithesis, measure about 6 cm. in diameter. From *B. rubifolia* it may easily be recognized in herbarium specimens by its large involucre and the unique characters of the involucral bracts. A detailed description is presented here:

Bidens Holwayi Sherff and Blake, sp. nov.—Herba scandens, caule demum 20–30 m. longo, ascendentē (ex HOLWAYO) in altitudinem 12–15 m.; ramis tetragonis, glabris, striatis. Folia opposita, petiolata, petiolo adjecto 6–18 cm. longa, tripartita aut summa indivisa, ciliata, supra glabrata (nisi ad venas), infra plus minusve piloso-hispida, serrata; foliolis lateralibus ovatis aut ovato-lanceolatis, terminali ovato-lanceolato aut lanceolato. Petioli 1.5–4 cm. longi, basi connati et hispido-ciliati. Capitula magna, ligulata, pedunculata pedunculis (in uno specimine observato) 12–13 cm. longis. Involucrum ad basim dense piloso-tomentosum, squamis longis dupli serie dispositis; exterioribus 8 (aut 9) late linearibus, hispido-ciliatis, subsparsim hispidis, 9–15 mm. longis; interioribus, saepe paulo brevioribus, anguste lanceolatis, ad faciem exteriorem piloso-tomentosis, marginibus diaphanis. Ligulae (5, aut interdum verisimiliter etiam 6 aut 7) linear-ellipticae, flavae, 9–11-striatae, 2.3–3 cm. longae, ad apicem irregulariter 2–4-dentatae aut lobulatae. Paleae lineares, demum 1.2–1.5 cm. longae, marginibus

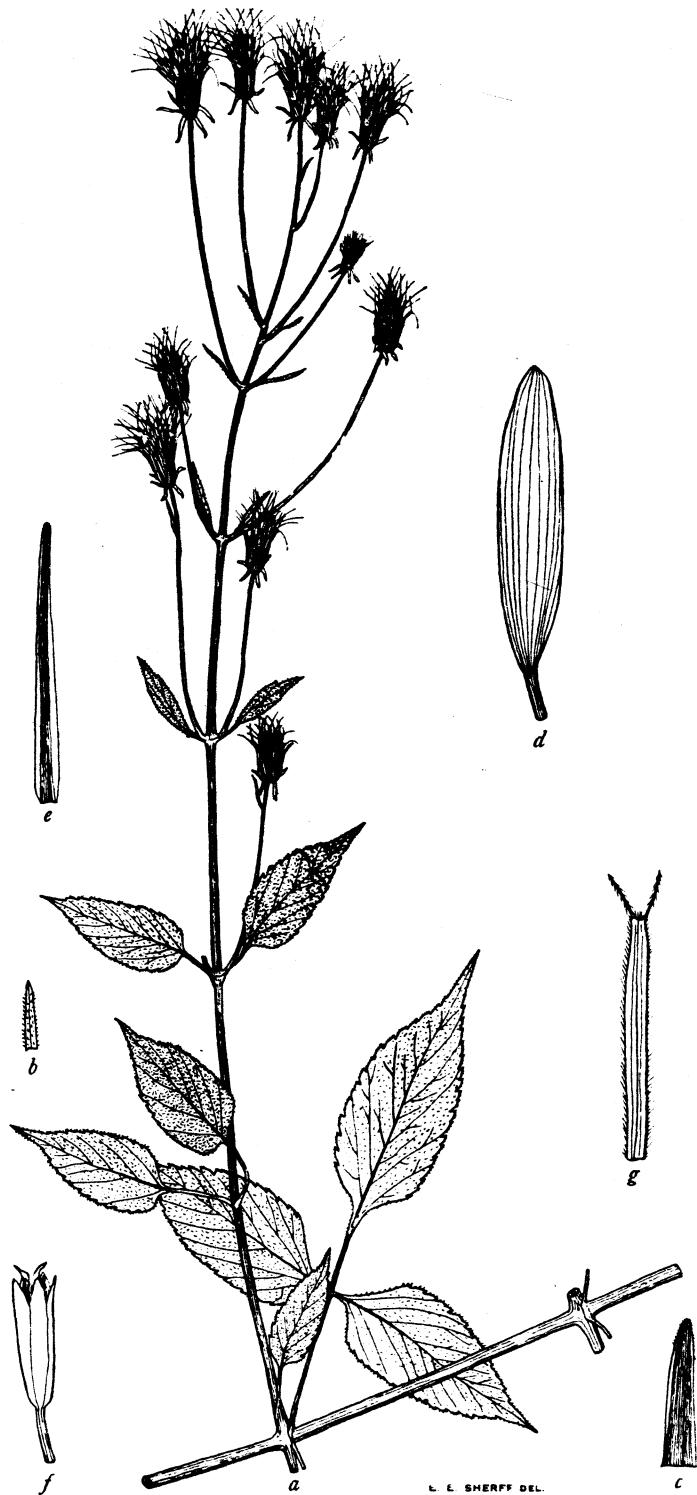
diaphanis. *Achaenia linearia*, *subplana*, *nigra*, *ciliata*, *ad facies* sparsim hispida, \pm 1.3 cm. longa, *ad apicem nonnullis erectis setis* coronata, biaristata aristis retrorsum hamosis et divaricantibus.

E. W. D. Holway 816, Quezaltenango, Guatemala, January 31, 1917 (type in Herb. Gray).

BIDENS SAMBUCIFOLIA Cav. Icon et Descript. 3:15. pl. 229. 1794; *Bidens alamosana* Rose, Contrib. U.S. Nat. Herb. 1:104 pl. 6. 1891.

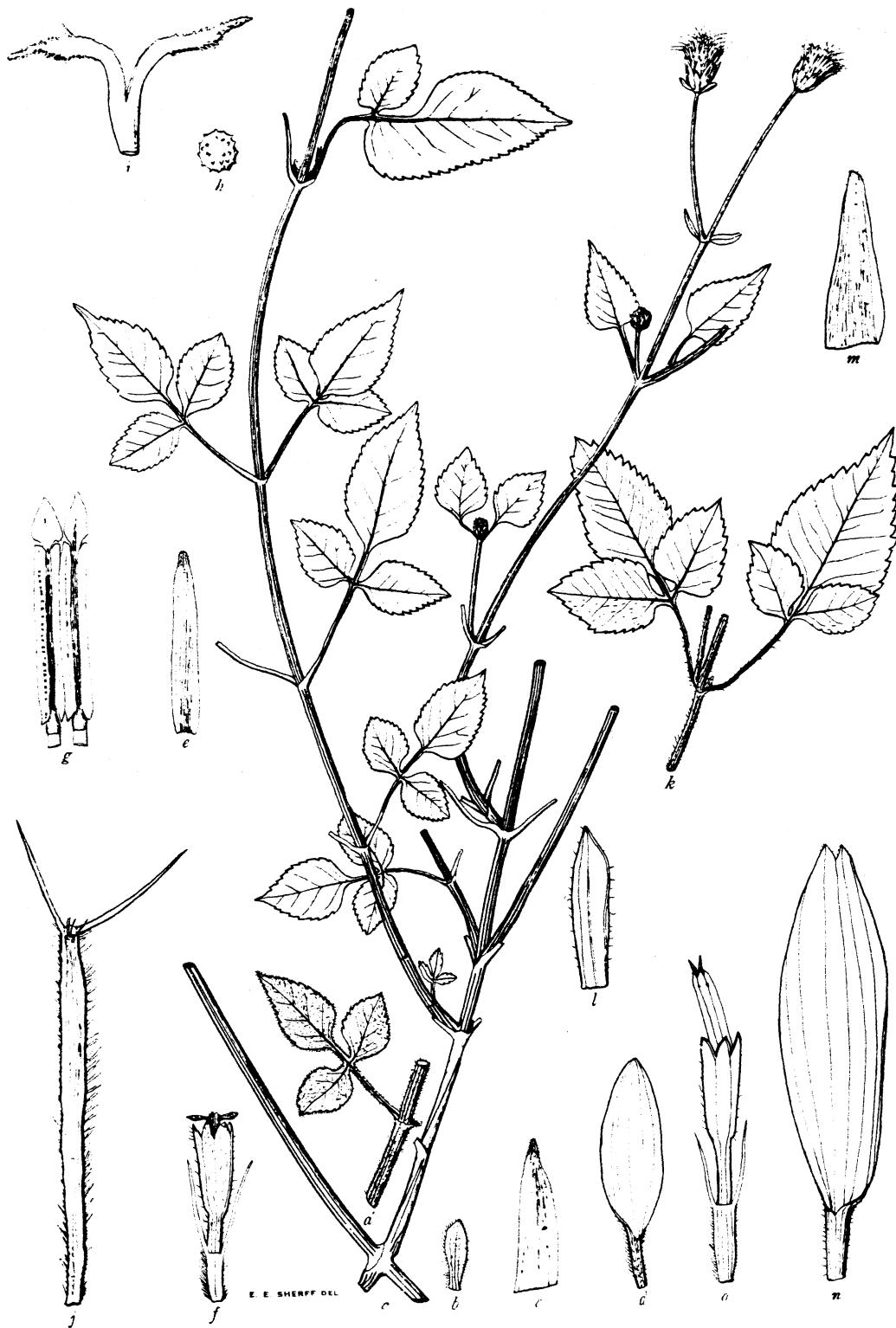
A comparison of the type illustration of *Bidens alamosana* with that of *B. sambucifolia* reveals a remarkable similarity. Furthermore, the descriptions of the two species are very close and differ materially only in that the ligules of *B. sambucifolia* are described as scarlet; those of *B. alamosana* are yellow or orange-yellow.

CAVANILLES' description was based upon material from the Royal Garden at Madrid and which was stated by him to have come originally from Peru and Mexico. It may well be that his citation of Peru was entirely erroneous, as I have never been able to find a specimen from elsewhere than Mexico. An examination of numerous specimens collected in Mexico shows the ligules to be usually yellow or orange-yellow, but in certain rare cases the ligules (in the dried specimens) have a color so reddish as to explain quite plausibly how Cavanilles was led to call them scarlet ("corolla . . . coccinea"). Thus, for example, a specimen by *T. S. Brandegee*, collected at Culiacan, Sinaloa, Mexico, September 12, 1904 (in Herb. Univ. California), has one flowering head with a distinct reddish shade to its orange ligules. The other two flowering heads present on the same sheet have yellow-orange ligules. Clearly, CAVANILLES and ROSE were dealing with the same species, and the name *Bidens sambucifolia*, antedating *B. alamosana* by nearly a century, must be used hereafter for this species.



L. E. SHERFF DEL.

SHERFF on BIDENS



E. E. SHERFF DEL.

SHERFF on BIDENS

EXPLANATION OF PLATES IX AND X

PLATE IX

Bidens squarrosa H.B.K.: *a*, fruiting spray $\times 0.75$; *b*, exterior bract $\times 3$; *c*, interior bract $\times 3$; *d*, ligulate floret $\times 3$; *e*, palea $\times 4.5$; *f*, disk floret $\times 4.5$; *g*, achene $\times 4.5$; all from type in Herb. Mus. Hist. Nat. Paris.

PLATE X

Bidens squarrosa H.B.K. (*B. antiquensis* Coult.): *a*, portion of branch $\times 0.7$; *a'* and *k*, small portions of 2 plants showing comparative pubescence $\times 0.7$; *b* and *l*, exterior bracts $\times 4$; *c* and *m*, interior bracts $\times 4$; *d* and *n*, ligulate florets $\times 4$; *e*, palea $\times 4$; *f* and *o*, disk florets $\times 4$; *g*, anthers $\times 35$; *h*, pollen grain $\times 1000$; *i*, style branches $\times 20$; *j*, achene $\times 6$; *a-j* from first type sheet and *k-o* from second type sheet of *Bidens antiquensis* (both J. D. Smith 2354 in Herb. Univ. Chicago).